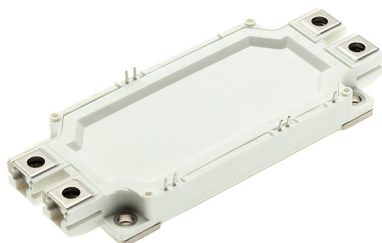


Half Bridge IGBT Module **multicomp**PRO

**RoHS
Compliant**



Features

- Trench Gate, Generation 5, TMOS IGBT
- High Thermal Cycling
- Cu Base with Enhanced Al₂O₃ Substrates
- 10μs Short Circuit Withstand

Key Parameters

V _{CES}	: 1700 V
V _{CE(sat)} * (typ)	: 1.8
I _C (max)	: 600 A
I _{C(RM)} (max)	: 1200 A

* Measured at the auxiliary terminals

Applications

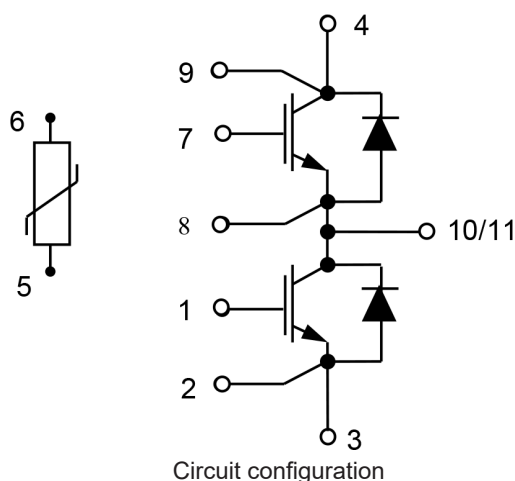
- Wind Turbines
- Power Charging Equipment
- Smart Grid
- High Reliability Inverters

The MP005809 is a half bridge 1700V, trench gate, insulated gate bipolar transistor (IGBT) module with enhanced field stop and implantation technology. The IGBT has a wide reverse bias safe operating area (RBSOA) plus 10μs short circuit withstand.

The module incorporates an electrically isolated base plate and low inductance construction enabling circuit designers to optimise circuit layouts and utilise grounded heat sinks for safety.

Absolute Maximum Ratings

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed. Exposure to Absolute Maximum Ratings may affect device reliability.



T_{case} = 25°C unless stated otherwise.

Symbol	Parameter	Test Conditions	Max.	Units
V _{CES}	Collector-emitter voltage	V _{GE} = 0V, T _C = 25°C	1700	V
V _{GES}	Gate-emitter voltage	T _C = 25°C	±20	
I _C	Continuous collector current	T _C = 100°C, T _{vj} max = 175°C	600	A
I _{C(PK)}	Peak collector current	t _P = 1ms	1200	
P _{max}	Max. transistor power dissipation	T _C = 25°C, T _{vj} = 175°C	3.26	kW
I ² t	Diode I ² t value	V _R = 0, t _p = 10ms, T _{vj} = 150°C	41.5	kA ² s
V _{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	3400	V

Newark.com/multicomp-pro
Farnell.com/multicomp-pro
Element14.com/multicomp-pro

multicompPRO

Half Bridge IGBT Module **multicomp**PRO

Thermal and Mechanical Ratings

Internal insulation material	: Al ₂ O ₃
Baseplate material	: Cu
Creepage distance – Terminal to heatsink	: 14.5mm
Creepage distance – Terminal to terminal	: 13mm
Clearance – Terminal to heatsink	: 12.5mm
Clearance – Terminal to terminal	: 10mm
CTI (Comparative Tracking Index)	: >200

Symbol	Parameter	Test Conditions	Min.	Max.	Units
R _{th(j-c)}	Thermal resistance– IGBT	Continuous dissipation - junction to case	-	46	°C/kW
R _{th(j-c)}	Thermal resistance – diode			80	
R _{th(c-h)}	Thermal resistance – case to heatsink (IGBT)	Mounting torque 5Nm (with mounting grease 1W/m °C)	-	-	
R _{th(c-h)}	Thermal resistance – case to heatsink (Diode)			-	
T _j	Junction temperature	IGBT	-40	150	°C
		Diode		125	
F _{stg}	Storage temperature range	-			
	Screw torque	Mounting – M5	3	6	Nm
		Electrical connections – M6	3	6	

Electrical Characteristics

T_{case} = 25°C unless stated otherwise.

Symbol	Parameter	Test Conditions	Min.	Typ	Max.	Units
I _{CES}	Collector cut-off current	V _{GE} = 0V, V _{CE} = V _{CES}			1	mA
		V _{GE} = 0V, V _{CE} = V _{CES} , T _C = 125°C			20	
		V _{GE} = 0V, V _{CE} = V _{CES} , T _C = 150°C			30	
I _{GES}	Gate leakage current	V _{GE} = ± 20V, V _{CE} = 0V			0.5	µA
V _{GE(TH)}	Gate threshold voltage	I _C = 15mA, V _{GE} = V _{CE}	5.6	6.2	6.4	V
V _{CE(sat)}	Collector-emitter saturation voltage	V _{GE} = 15V, I _C = 600A		1.8	2.25	
		V _{GE} = 15V, I _C = 600A, T _j = 125°C		2.2	2.6	
		V _{GE} = 15V, I _C = 600A, T _j = 150°C		2.3	2.7	
I _F	Diode forward current	DC		600		A
I _{FM}	Diode maximum forward current	t _p = 1ms		1200		
V _F	Diode forward voltage	I _F = 600A		1.85	2.2	V
		I _F = 600A, T _j = 125°C		2.1	2.3	
		I _F = 600A, T _j = 150°C				
C _{ies}	Input capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 100kHz		96		nF
Q _g	Gate charge	±15V		6.1		µC
Q _{res}	Reverse transfer capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 100kHz		0.7		nF
L _M	Module inductance			20		nH
R _{INT}	Internal transistor resistance			1		mΩ
SC _{Data}	Short circuit current, I _{sc}	T _j = 150°C, V _{CC} = 1000V t _p ≤ 10µs, V _{GE} ≤ 15V V _{CE(max)} = V _{CES} – L* x di/dt IEC 60747-9		2400		A

Newark.com/multicomp-pro
Farnell.com/multicomp-pro
Element14.com/multicomp-pro

multicompPRO

Half Bridge IGBT Module **multicomp**PRO

Note:

* L is the circuit inductance + L_M

NTC-Thermistor Data

Symbol	Parameter	Test Conditions	Min.	Typ	Max.	Units
R ₂₅	Rated Resistance	T _C = 25°C		5		kΩ
ΔR/R	Deviation of R ₁₀₀	T _C = 100°C, R ₁₀₀ = 493Ω	-5		5	%
P ₂₅	Power Dissipation	T _C = 25°C			20	m/W
B _{25/50}	B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15K))]$		3375		K
B _{25/80}		$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298.15K))]$		3411		
B _{25/100}		$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298.15K))]$		3433		

Electrical Characteristics

T_{case} = 25°C unless stated otherwise.

Symbol	Parameter	Test Conditions		Min.	Typ	Max.	Units
t _{d(off)}	Turn-off delay time	I _C = 600A V _{CE} = 900V V _{GE} = ±15V R _{G(OFF)} = 1Ω R _{G(ON)} = 1Ω L _S ~ 60nH	dv/dt = 5000V/μs		760		ns
t _f	Fall time				360		
E _{OFF}	Turn-off energy loss				135		
t _{d(on)}	Turn-on delay time		di/dt = 7700A/μs		285		ns
t _r	Rise time				81		
E _{ON}	Turn-on energy loss				45		
Q _{rr}	Diode reverse recovery charge	I _F = 600A V _{CE} = 900V di/dt = 7700A/μs			155		μC
I _{rr}	Diode reverse recovery current				720		A
E _{rec}	Diode reverse recovery energy				123		mJ

T_{case} = 125°C unless stated otherwise.

Symbol	Parameter	Test Conditions		Min.	Typ	Max.	Units
t _{d(off)}	Turn-off delay time	I _C = 600A V _{CE} = 900V V _{GE} = ±15V R _{G(OFF)} = 1Ω R _{G(ON)} = 1Ω L _S ~ 60nH	dv/dt = 5000V/μs		860		ns
t _f	Fall time				500		
E _{OFF}	Turn-off energy loss				183		
t _{d(on)}	Turn-on delay time		di/dt = 7700A/μs		295		ns
t _r	Rise time				85		
E _{ON}	Turn-on energy loss				61		
Q _{rr}	Diode reverse recovery charge	I _F = 600A V _{CE} = 900V di/dt = 7700A/μs			250		μC
I _{rr}	Diode reverse recovery current				810		A
E _{rec}	Diode reverse recovery energy				192		mJ

Half Bridge IGBT Module **multicomp**PRO

$T_{case} = 150^{\circ}C$ unless stated otherwise.

Symbol	Parameter	Test Conditions	Min.	Typ	Max.	Units
$t_{d(off)}$	Turn-off delay time	$I_C = 600A$ $V_{CE} = 900V$ $V_{GE} = \pm 15V$ $R_{G(OFF)} = 1\Omega$ $R_{G(ON)} = 1\Omega$ $L_s \sim 60nH$		870		ns
t_f	Fall time			535		
E_{OFF}	Turn-off energy loss			194		
$t_{d(on)}$	Turn-on delay time			300		ns
t_r	Rise time			86		
E_{ON}	Turn-on energy loss			67		
Q_{rr}	Diode reverse recovery charge	$I_F = 600A$ $V_{CE} = 900V$ $di/dt = 7700A/\mu s$		270		μC
I_{rr}	Diode reverse recovery current			830		A
E_{rec}	Diode reverse recovery energy			209		mJ

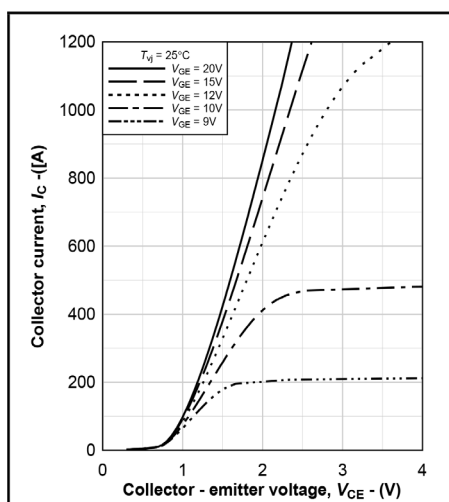


Fig. 3 Typical IGBT output characteristics, $I_C = f(V_{CE})$

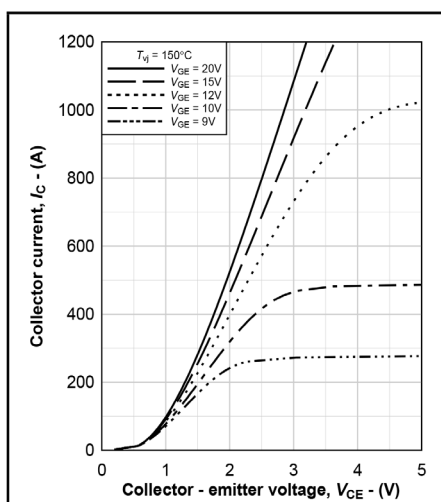


Fig. 4 Typical IGBT output characteristics, $I_C = f(V_{CE})$

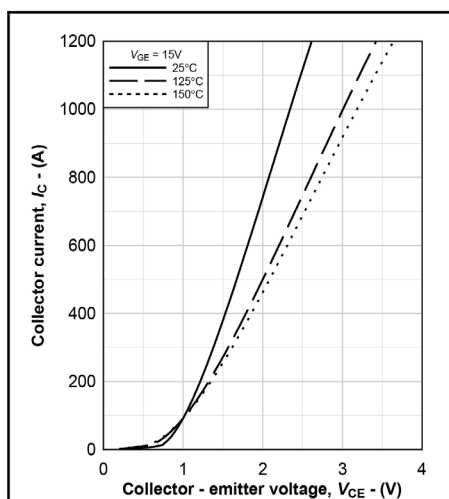


Fig. 5 Typical IGBT output characteristics, $I_C = f(V_{CE})$

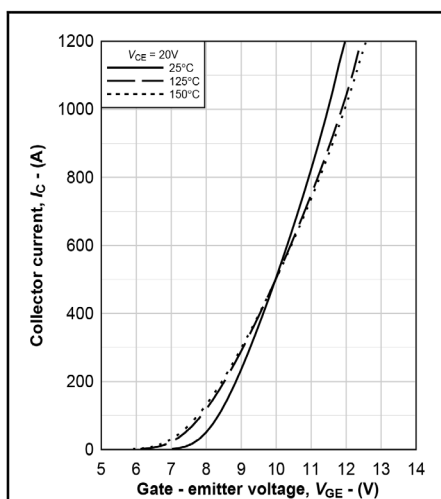


Fig. 6 Typical IGBT transfer characteristics, $I_C = f(V_{GE})$

Half Bridge IGBT Module **multicomp**PRO

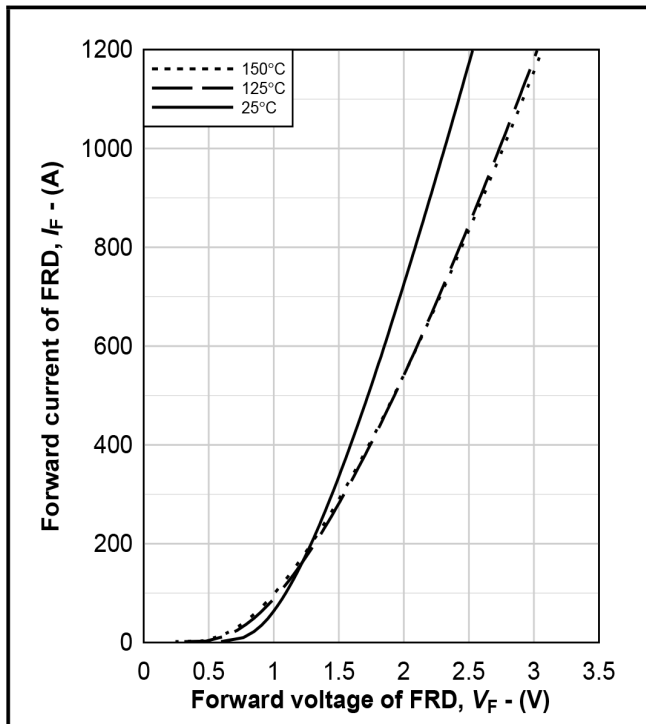


Fig. 7 Typical FRD E_{rec} , $E_{\text{rec}} = f(R_G)$

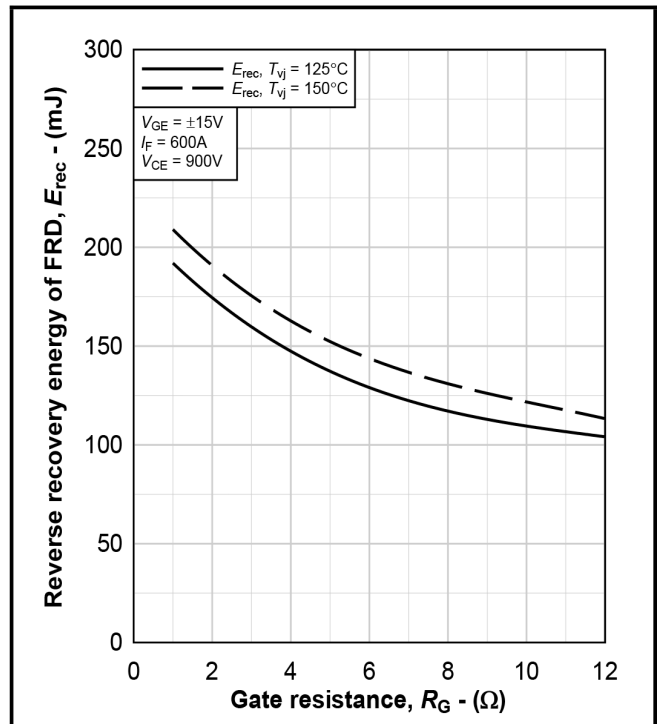


Fig. 8 Typical FRD E_{rec} , $E_{\text{rec}} = f(R_G)$

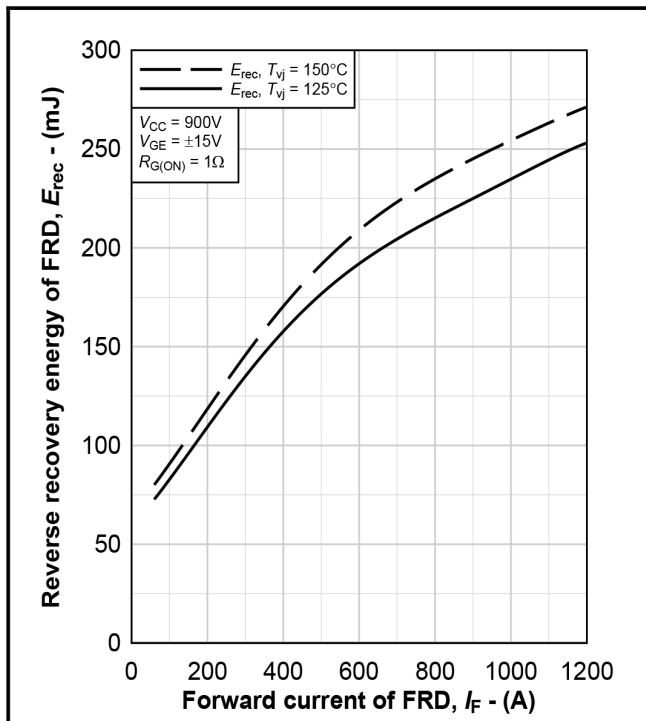


Fig. 9 Typical FRD E_{rec} , $E_{\text{rec}} = f(I_F)$

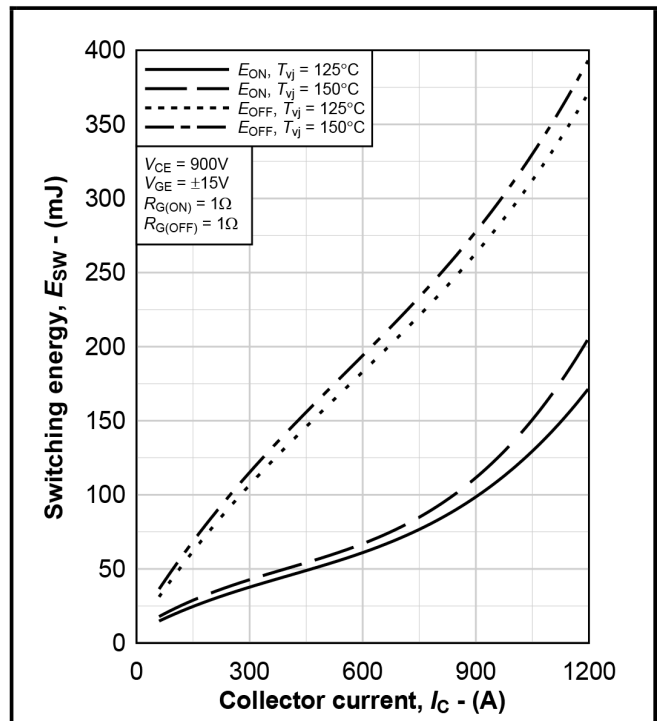
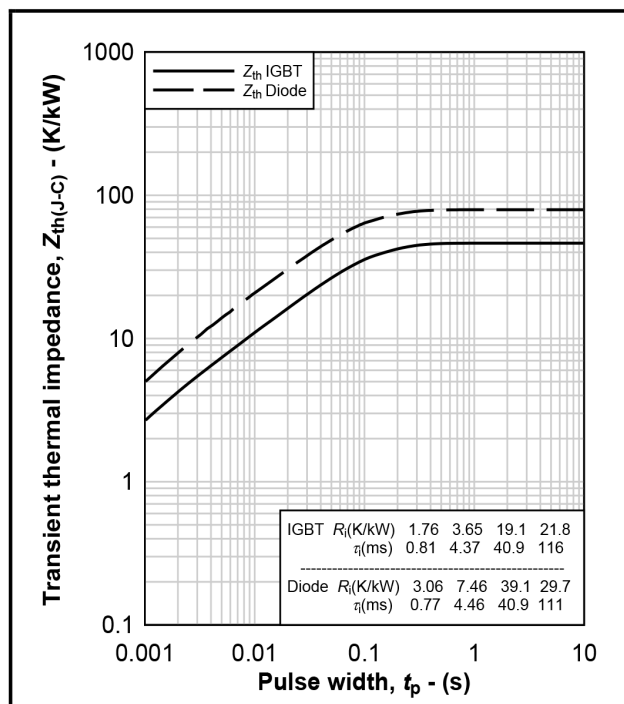
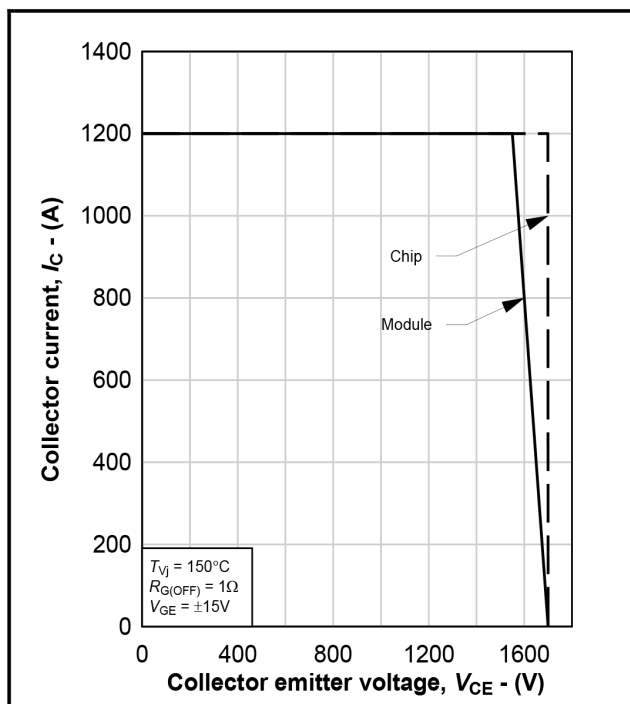
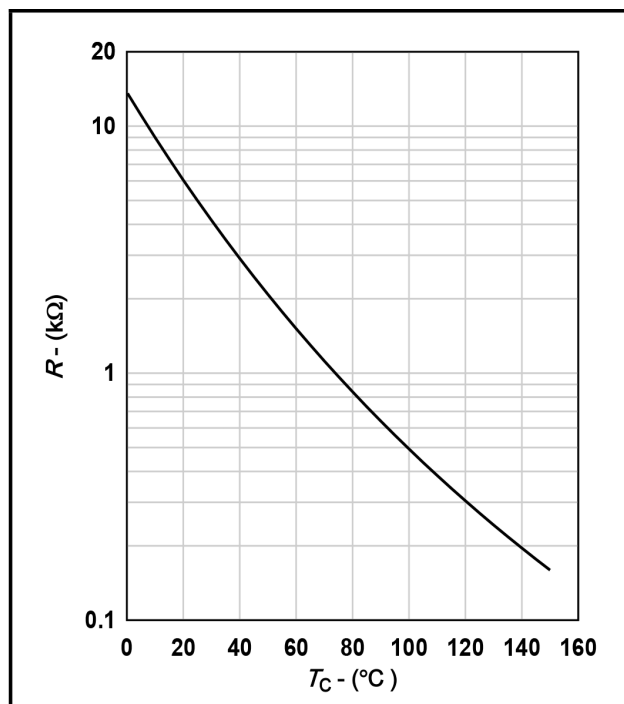
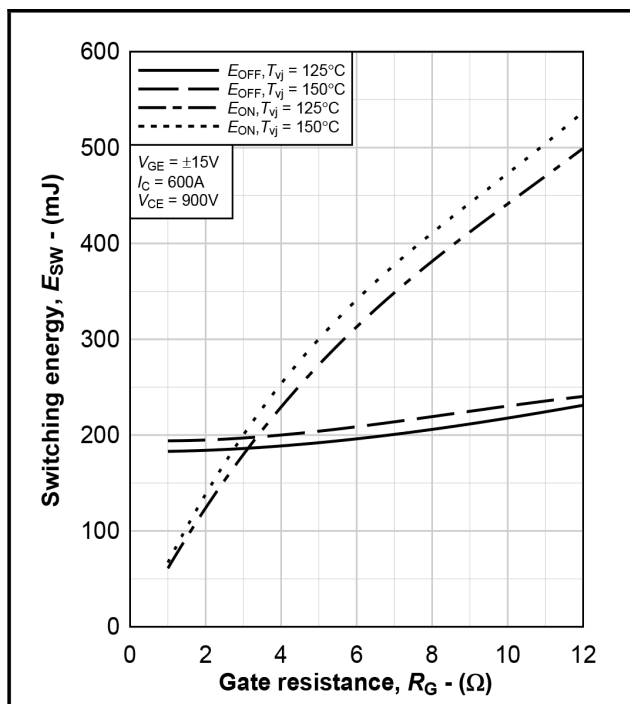
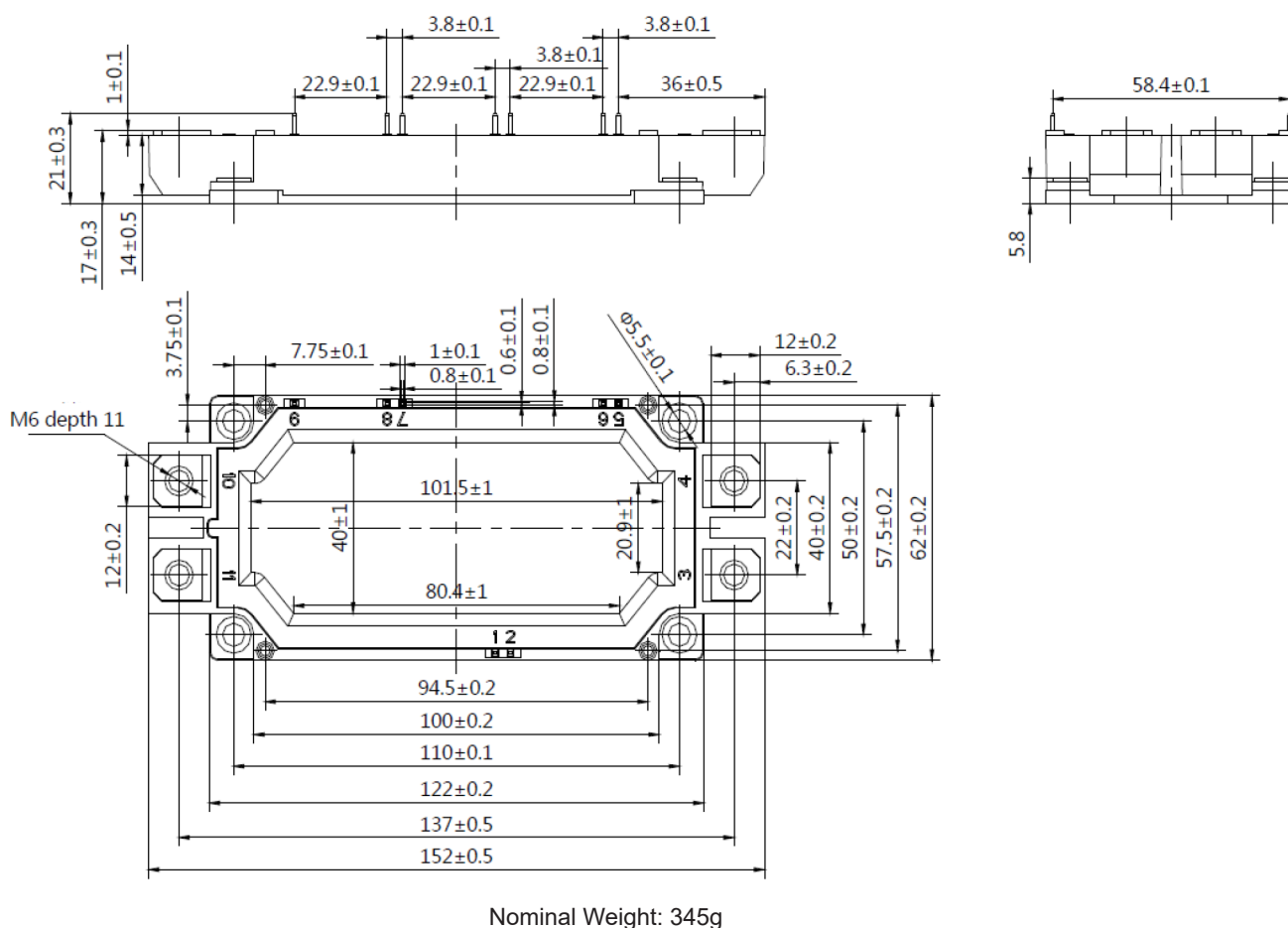


Fig. 10 Typical IGBT switching energy, $E_{\text{ON}} = f(I_C)$, $E_{\text{OFF}} = f(I_C)$

Half Bridge IGBT Module **multicomp**PRO



Half Bridge IGBT Module multicomp^{PRO}



Part Number Table

Description	Part Number
Half Bridge IGBT Module, 1700V, 600A, M1 Case Code	MPIM600M117TG5

Important Notice : This data sheet and its contents (the "Information") belong to the members of the AVNET group of companies (the "Group") or are licensed to it. No licence is granted for the use of it other than for information purposes in connection with the products to which it relates. No licence of any intellectual property rights is granted. The Information is subject to change without notice and replaces all data sheets previously supplied. The Information supplied is believed to be accurate but the Group assumes no responsibility for its accuracy or completeness, any error in or omission from it or for any use made of it. Users of this data sheet should check for themselves the Information and the suitability of the products for their purpose and not make any assumptions based on information included or omitted. Liability for loss or damage resulting from any reliance on the Information or use of it (including liability resulting from negligence or where the Group was aware of the possibility of such loss or damage arising) is excluded. This will not operate to limit or restrict the Group's liability for death or personal injury resulting from its negligence. Multicomp Pro is the registered trademark of Premier Farnell Limited 2019.

Newark.com/multicomp-pro
Farnell.com/multicomp-pro
Element14.com/multicomp-pro

multicomp^{PRO}